

CLAIMS

[1] A liquid type identification apparatus for a light oil, for identifying the type and distillation properties of a light oil, comprising:

5 a liquid type identification chamber for a light oil, for allowing a light oil to be identified, which has been introduced into a liquid type identification apparatus body, to temporarily stay
10 therein;

a liquid type identification sensor heater provided within the light oil type identification chamber; and

15 a liquid temperature sensor spaced by a given distance from the liquid type identification sensor heater and provided within the light oil type identification chamber,

the liquid type identification sensor heater comprising a heater and an identification liquid
20 temperature sensor provided in the vicinity of the heater,

the liquid type identification apparatus further comprising an identification control unit;

the identification control unit being constructed

that a pulse voltage is applied to the liquid type identification sensor heater for a predetermined period of time, and the light oil to be identified which temporarily stays within the liquid type identification chamber for a light oil is heated by the heater, and the liquid type is identified with a voltage output difference V_0 , corresponding to a temperature difference between the initial temperature and the peak temperature of the identification liquid temperature sensor.

[2] The liquid type identification apparatus for a light oil according to claim 1, characterized in that the voltage output difference V_0 is the difference in voltage between an average initial voltage V_1 determined by sampling the initial voltage before the application of the pulse voltage by a predetermined number of times and an average peak voltage V_2 determined by sampling the peak voltage after the application of the pulse voltage by a predetermined number of times, that is,

$$V_0 = V_2 - V_1.$$

[3] The liquid type identification apparatus for a

light oil according to claim 1 or 2, characterized
in that the identification control unit is
constructed so that the type of the light oil is
identified using the voltage output difference V_0
5 obtained for the light oil to be identified,

based on calibration curve data as a
correlation between temperature and voltage output
difference, for predetermined reference light oils
previously stored in the identification control unit.

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[4] The liquid type identification apparatus for a
light oil according to any one of claims 1 to 3,
characterized in that

the identification control unit is constructed
15 so that a liquid type voltage output V_{out} for the
voltage output difference V_0 at a measuring
temperature for the light oil to be identified is
corrected in a correlation with the output voltage
for the voltage output difference at the measuring
20 temperature for a predetermined threshold reference
light oil.

[5] The liquid type identification apparatus for a
light oil according to any one of claims 1 to 3,

characterized in that the liquid type identification sensor heater is a laminated liquid type identification sensor heater in which a heater and an identification liquid temperature sensor are
5 laminated through an insulating layer.

[6] The liquid type identification apparatus for a light oil according to any of claims 1 to 5, characterized in that the heater and identification
10 liquid temperature sensor in the liquid type identification sensor heater each are constructed so as to come into contact with the light oil to be identified through a metallic fin.

15 [7] The liquid type identification apparatus for a light oil according to any of claims 1 to 6, characterized in that the liquid temperature sensor is constructed so as to come into contact with the light oil to be identified through the metallic fin.

20 [8] A liquid type identification method for a light oil, for identifying the type and distillation properties of a light oil, comprising the steps of:
applying a pulse voltage for a predetermined

period of time to a liquid type identification sensor heater comprising a heater and an identification liquid temperature sensor provided in the vicinity of the heater;

5 heating the light oil to be identified by the heater; and

 identifying the liquid type with a voltage output difference V_0 , corresponding to a temperature difference between the initial temperature and the
10 peak temperature of the identification liquid temperature sensor.

[9] The liquid type identification method for a light oil according to claim 8, characterized in
15 that the voltage output difference V_0 is the difference in voltage between an average initial voltage V_1 determined by sampling the initial voltage before the application of the pulse voltage by a predetermined number of times and an average
20 peak voltage V_2 determined by sampling the peak voltage after the application of the pulse voltage by a predetermined number of times, that is,
$$V_0 = V_2 - V_1.$$

[10] The liquid type identification method for a light oil according to claim 8 or 9, characterized in that the identification control unit is constructed so that the type of the light oil is identified using the voltage output difference V_0 obtained for the light oil to be identified,

5 based on calibration curve data as a correlation between temperature and voltage output difference, for predetermined reference light oils previously stored in the identification control unit.

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[11] The liquid type identification method for a light oil according to any one of claims 8 to 10, characterized in that

15 a liquid type voltage output V_{out} for the voltage output difference V_0 at a measuring temperature for the light oil to be identified is corrected in a correlation with the output voltage for the voltage output difference at the measuring temperature for a predetermined threshold reference light oil.

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[12] The liquid type identification method for a light oil according to any one of claims 8 to 11,

characterized in that the liquid type identification sensor heater is a laminated liquid type identification sensor heater in which a heater and an identification liquid temperature sensor are
5 laminated through an insulating layer.

[13] The liquid type identification method for a light oil according to any of claims 8 to 12, characterized in that the heater and identification liquid
10 temperature sensor in the liquid type identification sensor heater each are constructed so as to come into contact with the light oil to be identified through a metallic fin.

15 [14] The liquid type identification method for a light oil according to any of claims 8 to 13, characterized in that the liquid temperature sensor is constructed so as to come into contact with the light oil to be identified through the metallic fin.

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[15] A liquid type identification apparatus for an automotive light oil, for identifying the type and distillation properties of the light oil, comprising:

the liquid type identification apparatuses for a light oil according to any of claims 1 to 7 which is provided within a light oil tank or on the upstream side or downstream side of a light oil pump.

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[16] A liquid type identification method for an automotive light oil, for identifying the type and distillation properties of the light oil, comprising:

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identifying the type and distillation properties of the light oil in a light oil tank or on the upstream side or downstream side of a light oil pump, by using any of the methods for identifying the liquid type of the light oil according to any of claims 8 to 14.

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[17] An automotive exhaust gas reduction apparatus comprising:

the above liquid type identification

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apparatuses for a light oil according to any of claims 1 to 7, which is provided within a light oil tank or on the upstream side or downstream side of a light oil pump; and

an ignition timing control unit for regulating

ignition timing based on the type of the light oil,
which is identified by the liquid type
identification apparatus for a light oil.

5 [18] An automotive exhaust gas reduction method,
comprising the steps of:

identifying the type and distillation
properties of the light oil in a light oil tank or
on the upstream side or downstream side of a light
oil pump, by using any of the methods for
10 identifying the liquid type of a light oil of claims
8 to 14, and

regulating an ignition timing based on the type
of the light oil which is identified by the liquid
type identification apparatus for a light oil.
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[19] An automotive exhaust gas reduction apparatus
comprising:

the above liquid type identification
apparatuses for a light oil according to any of
20 claims 1 to 7, which is provided within a light oil
tank or on the upstream side or downstream side of a
light oil pump; and

a light oil compression control unit for

regulating the compression ratio of the light oil based on the type of the light oil which is identified by the liquid type identification apparatus for a light oil.

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[20] An automotive exhaust gas reduction method, comprising the steps of:

identifying the type and distillation properties of the light oil in a light oil tank or on the upstream side or downstream side of a light oil pump, by using any of the methods for identifying liquid type of a light oil of claims 8 to 14, and

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regulating the compression ratio of the light oil based on the type of the light oil which is identified by the liquid type identification apparatus for a light oil.

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